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ABSTRACT

The Materials and Assistance in Science Teaching project carried out a model program for improving science teaching in all 125 elementary classrooms in the Cotati-Rohnert Park Unified School District of Northern California. The project was a cooperative activity involving Sonoma State University and the school district, with funding shared by both. Its first year was devoted to adapting effective teaching techniques and methods to the specific objectives identified by the school district and to producing instructional kits and written information for teachers. Design and production were carried out by a team of school district teachers and a university science educator. Many district teachers were included in field trials and material evaluation to encourage them to commit to the project's goals and to ensure conformity to local needs. The project's second year was devoted to in-service training of all 125 teachers. District science mentor teachers provided three days of inservice training on the appropriate use of the instructional materials for all district teachers. Follow-up evaluation shows the project helped establish a uniform core science curriculum for the district. Teachers regarded the fact that the materials were developed by local colleagues as the most important factor in teachers' acceptance of the project. (Author/MSE)

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Materials and Assistance for Science Teaching

Project MAST

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AASCU/ERIC Model Programs Inventory Project

The AASCU/ERIC Model Programs Inventory is a two-year project seeking to establish and test a model system for collecting and disseminating information on model programs at AASCU-member institutions--375 of the public four-year colleges and universities in the United States.

The four objectives of the project are:

- To increase the information on model programs available to all institutions through the ERIC system
- To encourage the use of the ERIC system by AASCU institutions
- To improve AASCU's ability to know about, and share information on, activities at member institutions, and
- To test a model for collaboration with ERIC that other national organizations might adopt.

The AASCU/ERIC Model Programs Inventory Project is funded with a grant from the Fund for the Improvement of Postsecondary Education to the American Association of State Colleges and Universities, in collaboration with the ERIC Clearinghouse on Higher Education at The George Washington University.

ABSTRACT

Materials and Assistance in Science Teaching, Project MAST, carried out a model program for improving science teaching in all 125 elementary classrooms of the Cotati-Rohnert Park Unified School District which is located in Northern California. The project was a cooperative activity involving Sonoma State University and the Cotati-Rohnert Park School District and the project budget was shared by the university and the school district. Project MAST adapted existing elementary teaching materials and methods to meet the curricular objectives established by the district in its program to implement a comprehensive elementary science program. Project MAST devoted its first year to adapting effective teaching techniques and materials to the specific objectives identified by the school district and to producing instructional kits of materials and written information for the teachers. This design and production effort was carried out by a team of school district teachers and a Sonoma State University science educator. Inclusion of many district teachers in field trials and evaluation of teaching materials was emphasized in order to encourage district teachers to commit to the goals of the project and to ensure conformance with local needs. The second year of Project MAST was devoted to inservice training of all 125 teachers in the district. District science mentor teachers provided three days of inservice training on the appropriate use of the instructional materials for all district teachers. Followup evaluation has shown that Project MAST helped to establish a uniform core science curriculum throughout the district. District teachers regarded the fact that the instructional materials were developed by teachers from the district as the most important factor in teachers' acceptance of the project.

BACKGROUND

Project MAST was a cooperative effort involving Sonoma State University, one of the nineteen campuses of the California State University, and the Cotati-Rohnert Park Unified School District, a suburban school district located in the San Francisco Bay area with 125 teachers teaching in grades K-6.

Project MAST addressed one problem area in elementary school science: little science instruction is offered, and when it is offered it is often fragmented and not articulated within the school district. Project MAST attempted to reshape the science teaching climate within the Cotati-Rohnert Park School District by:

• Producing teaching materials articulated for each grade K-6. A comprehensive, grade-by-grade curriculum is needed for an entire district to offer a core science curriculum to all students. In addition, the particular content which an individual teacher must be personally competent in is minimized by placing responsibility for a well-defined set of content with each grade.

• Reducing teacher anxiety about teaching science. Teacher anxiety, which is the principal reason little science is taught, is based on a lack of science training and the perception that science instruction required difficult-to-assemble materials.

• Emphasizing science as process with the concomitant goal of encouraging the development of critical thinking skills.

• Encouraging the formation of support networks with the school district. Effective models of inservice education involve teachers and other local resource people working together to provide long-lasting motivation and support.

Project MAST was motivated by a desire to apply these principles throughout an entire school district. In addition, Project MAST adapted aspects of the effective K-6 science materials which have been developed over the last thirty years. These materials, such as Elementary Science Study and Science Curriculum Improvement Study, emphasize process thinking skills and have been shown to be more effective than traditional materials. However, these materials have not gained widespread acceptance and have not provided a solution to the problem of providing articulated instructional throughout districts due to teachers' perceptions that they rely

on special purpose apparatus which is not easily replaced, that they require teachers to be unduly familiar with the concepts studied, and that they are not easily adapted to the present school expectations of explicit performance objectives at each grade level. Project MAST attempted to modify effective curricula to meet local needs through a process which encouraged teachers' favorable reactions.

DESCRIPTION

Project MAST involved a two-year program of K-6 science instructional unit design and testing, teacher inservice education in the use of these instructional units, and evaluation of this model as a cost-effective large-scale science teaching improvement project.

step 1. During AY 87-88 a design team consisting of three Cotati-Rohnert Park School District teachers and one Sonoma State University science educator designed instructional units for grades K-6. The design team met with a group of two teachers from each of the eight elementary schools in the district in order to assure close connection between classroom teachers from all eight schools and the design process. The instructional units had these characteristics:

- they are grade-specific;

- they met locally established learning objectives in both science content and process;

- they were adapted from existing effective science curricula;

- they emphasized locally available and inexpensive teaching materials;

- they represented the content strands from life science, earth science, and physical science suggested by the *California State Science Framework.*

step 2. "Draft" instructional kits were assembled by the design team and field tested at each of the schools in the district. Field test teachers reported back to the design team and modifications to the original draft materials were made. Twenty-five of the 125 teachers in the district were involved in the writing or field testing of these materials. Classroom kits of instructional materials were assembled by district teachers during summer, 1988.

step 3. During AY 88-89 three days of inservice instruction was provided for all 125 elementary teachers in the district. District teachers who played a senior role in the design of the materials provided the trainings.

step 4. The effectiveness of the project was evaluated through anecdotal teacher reports and through a survey form.

RESULTS

Project MAST experienced success in providing a uniform core science curriculum throughout the 125 classrooms of the Cotati-Rohnert Park School District. Reports from district administrators, district science mentor teachers, and district media aids who were responsible for kit checkout all indicate that over one-half of the teachers in the district were using the instructional materials in their classrooms by the end of the 1989 school year, which was the second year of the project. Long-term data is not yet available.

Survey of teachers attending inservice training sessions indicated that local materials development was very important. Over ninety-percent responded that local development was an important factor in their decision to use the materials. In addition to this psychological factor, annual instructional kit maintenance provides another strong rationale for local materials development. The Cotati-Rohnert Park School District has been able to modify the original kit production system to provide a mechanism for annual kit resupply.

It is too early to determine whether Project MAST was successful in its goal to change the long-term climate of elementary science teaching throughout the Cotati-Rohnert Park School District. However, the evidence points to the fact that Project MAST has brought attention to science teaching, that many teachers are using the materials developed by the project, and that the district administration has been supportive of the project and continues to view it as an important facet of the overall district instructional program.

CONCLUSIONS AND RECOMMENDATIONS

Project MAST provides a model for one approach to the improvement of elementary science teaching. The model involves local development of curricular materials, local production of kits of instructional materials, and inservice training provided by the same teachers who were involved in the design of the materials in the first place. This model is cost-effective and motivates teachers to view the materials and process as "theirs." This model also provides the basis for further projects involving additional sets of teachers. By starting with the all-ready developed materials, which are all contained on Macintosh format computer diskettes, new groups of teachers can go through a similar process of local development, but with a "head start" towards a finished product.

This model has two distinct limitations: classroom teachers may not have expert knowledge needed to develop first-rate instructional materials; and the inservice instruction provided for each teacher was limited to three days. This is not enough time to bring about fundamental changes in teachers science content knowledge or pedagogical skills. However, these limitations have not prevented Project MAST from attempting to begin the process of changing the view of science teaching throughout a school district by providing a core science curriculum which was developed by many of the same classroom teachers which will use the curriculum.

In summary, the results of Project MAST indicate that local development of materials and training by local teachers provide one effective model for bringing about a commitment for science teaching throughout school districts. This program could be duplicated at other universities in cooperation with motivated school districts.